



Collaborative Writing and Publishing with LaTeX

*(or 'How to lay out your manuscripts, theses and reports like a pro')*

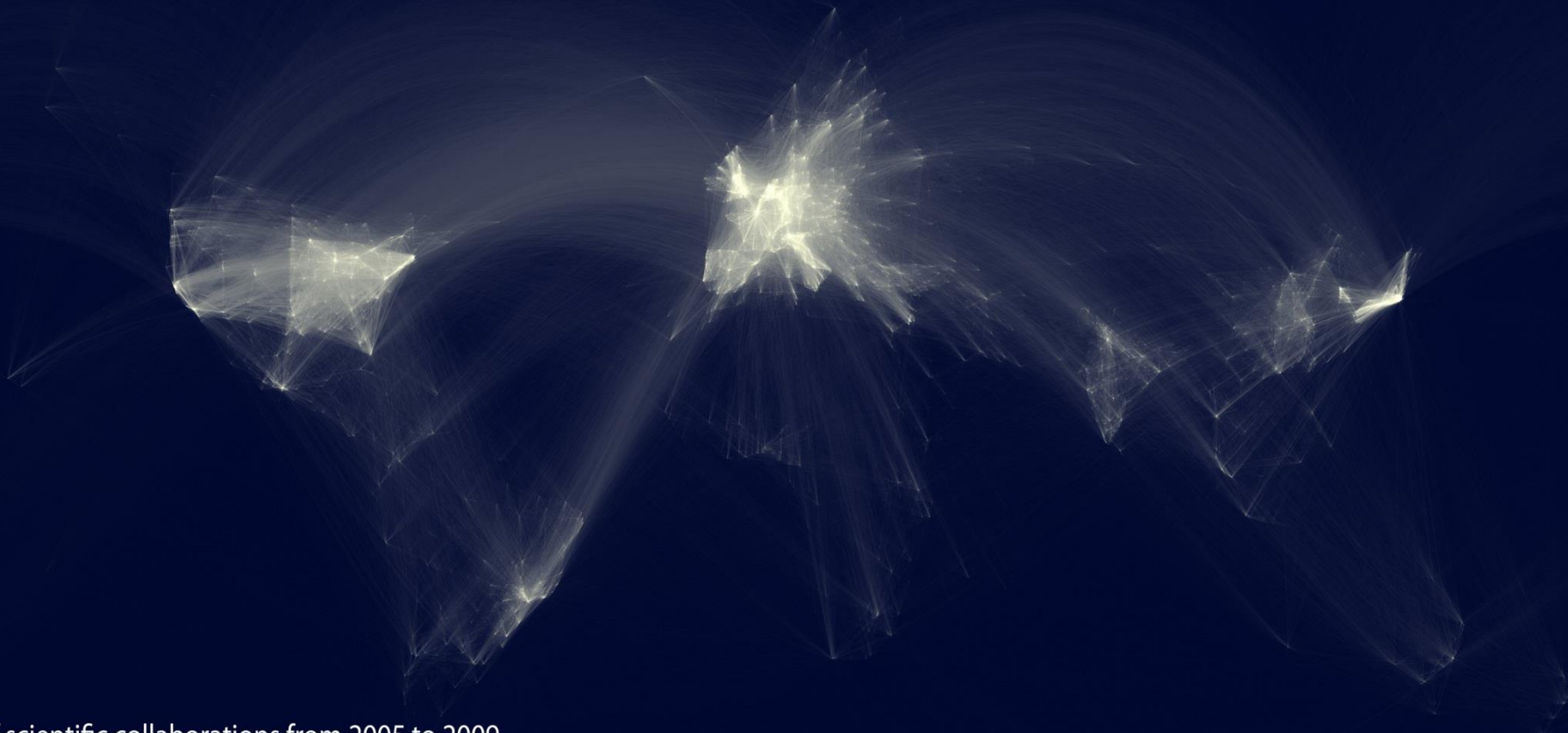
[www.overleaf.com](http://www.overleaf.com) | [@DrHammersley](https://twitter.com/DrHammersley)

# Workshop Overview

- An Introduction to Overleaf and LaTeX
- Getting started with LaTeX templates
- Getting more out of LaTeX & Overleaf - features including Mendeley, Git and Plot.ly integrations, and easy table creation and symbol lookup.



# The internet is transforming research...



Map of scientific collaborations from 2005 to 2009

Computed by Olivier H. Beauchesne @ Science-Metrix, Inc.

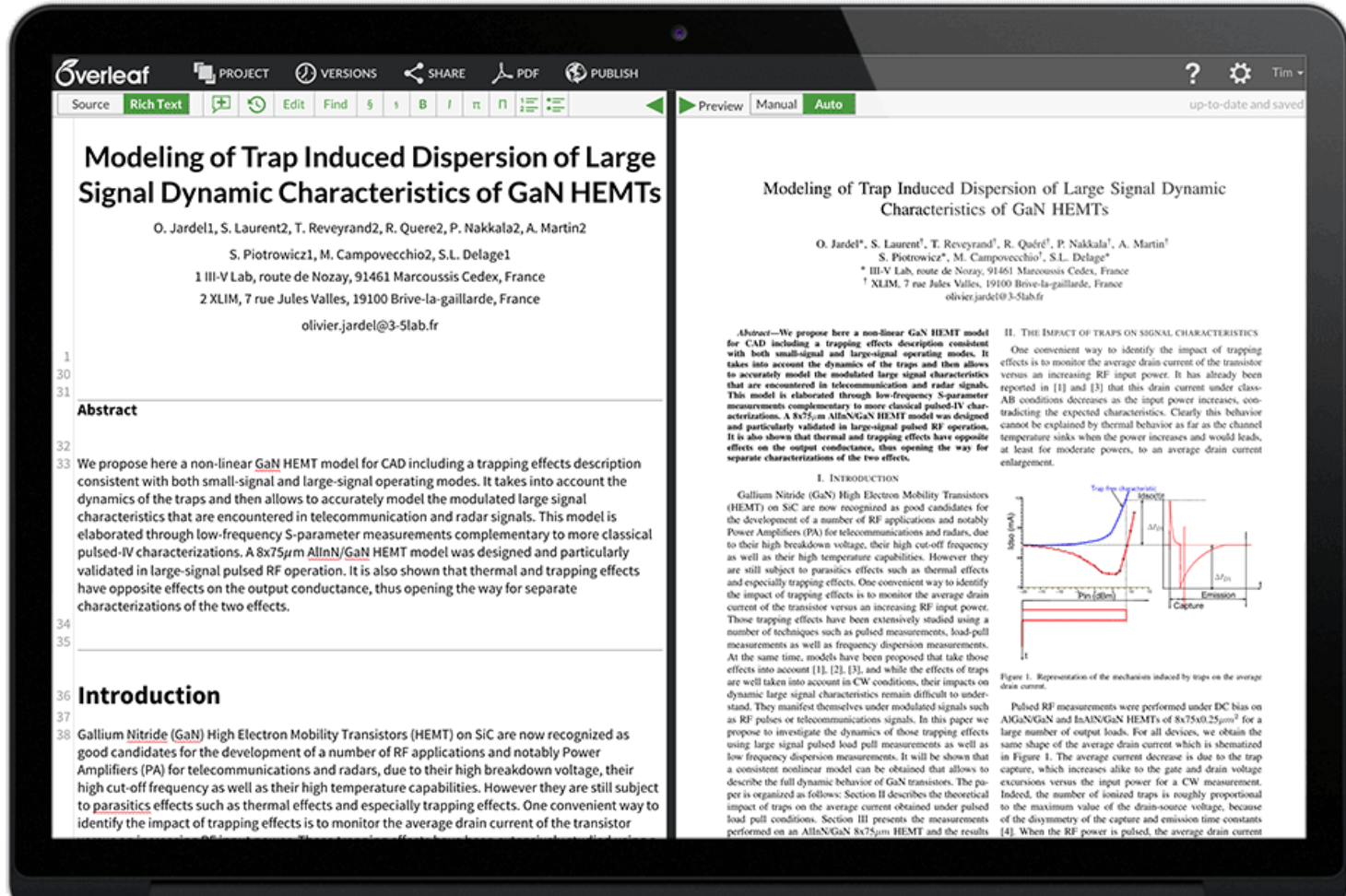
Data from Scopus, using books, trade journals and peer-reviewed journals



## Some of the problems...

- Long email chains passing files around;
- Dealing with multiple versions of the same document;
- Hours spent formatting & typesetting;

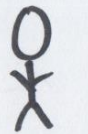
# Overleaf – an online collaborative writing platform





AUTHORS

①

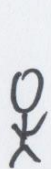


REVIEWERS

②

READERS

④



Overleaf



PUBLISHERS

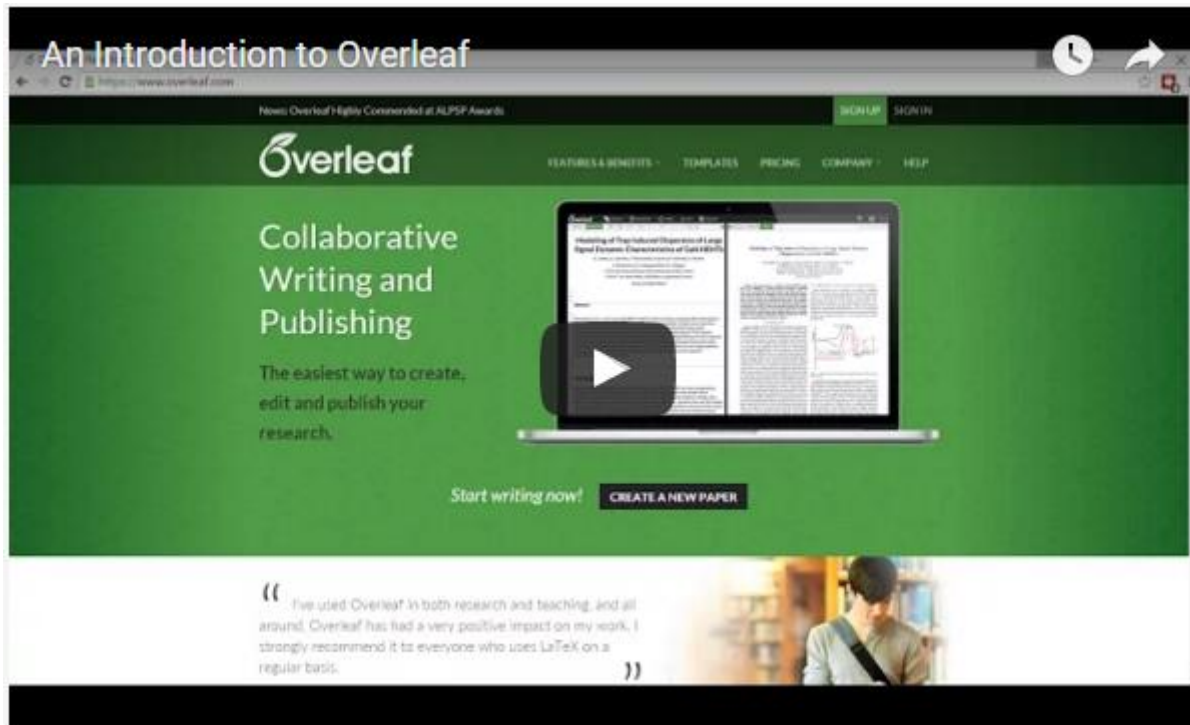
③

## Online collaborative editing tools provide...

- No need to email files – simply send the link;
- One version of the document, accessible by all collaborators;
- Typesetting is done automatically in the background whilst you type (via LaTeX);







<https://www.overleaf.com/tutorial>

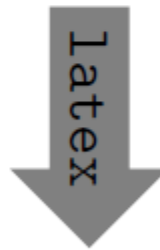
# Why LaTeX?

- It makes beautiful documents
  - It's easy to spot a LaTeX document in a pile of Word docs
- It was created by scientists, for scientists
  - A large and active community
- It is powerful | you can extend it
  - Packages for papers, presentations, spreadsheets, . . .

## How does it work?

- ▶ You write your document in plain text with `commands` that describe its structure and meaning.
- ▶ The `latex` program processes your text and commands to produce a beautifully formatted document.

```
The rain in Spain falls \emph{mainly} on the plain.
```



```
The rain in Spain falls mainly on the plain.
```

- ▶ Tell L<sup>A</sup>T<sub>E</sub>X the `\title` and `\author` names in the preamble.
- ▶ Then use `\maketitle` in the document to actually create the title.
- ▶ Use the abstract environment to make an abstract.

```
\documentclass{article}

\title{The Title}

\author{A. Author}

\date{\today}

\begin{document}
\maketitle

\begin{abstract}
Abstract goes here...
\end{abstract}

\end{document}
```

The Title

A. Author

February 18, 2013

Abstract

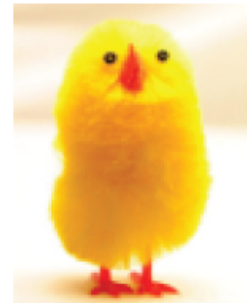
Abstract goes here...

## But it can start to get complicated....

```
\begin{itemize}
\item Tea
\item Milk
\item Biscuits
\end{itemize}
```

- ▶ Tea
- ▶ Milk
- ▶ Biscuits

```
\begin{figure}
\includegraphics{chick}
\end{figure}
```



```
\begin{equation}
\alpha + \beta + 1
\end{equation}
```

$$\alpha + \beta + 1 \quad (1)$$



# Making it easier...

- Cloud-based tools provides LaTeX in your browser
- There's nothing to download or install
- Access your projects from anywhere, any device

#CampusChallenge: Win a Free Year of Pro for your University

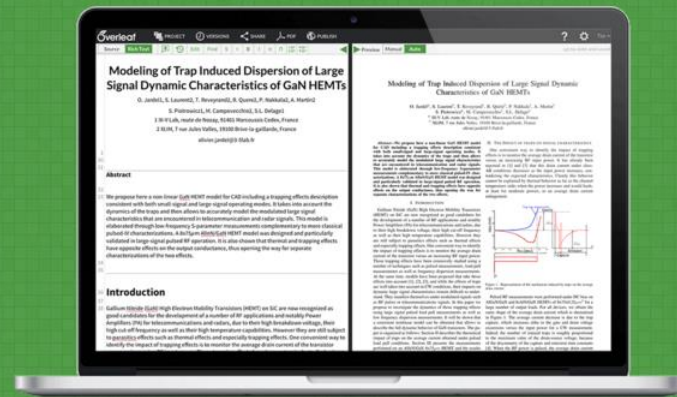
My Projects John Hammersley ▾



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- Résumé / CV
- Formal Letter
- Homework Assignment
- Newsletter
- Poster

# Edit on the left, preview on the right

The image shows a laptop displaying the Overleaf online LaTeX editor. The interface is split into two main panes: 'Edit' on the left and 'Preview' on the right. The top navigation bar includes 'PROJECT', 'VERSIONS', 'SHARE', 'PDF', and 'PUBLISH' buttons. The 'Edit' pane shows a document with a title, authors, abstract, and introduction. The 'Preview' pane shows the rendered version of the same document, including a figure with a graph and a caption. The document content is as follows:

**Modeling of Trap Induced Dispersion of Large Signal Dynamic Characteristics of GaN HEMTs**

O. Jardel<sup>1</sup>, S. Laurent<sup>2</sup>, T. Reveyrand<sup>2</sup>, R. Quere<sup>2</sup>, P. Nakkala<sup>2</sup>, A. Martin<sup>2</sup>  
S. Piotrowicz<sup>1</sup>, M. Campovecchio<sup>2</sup>, S.L. Delage<sup>1</sup>  
<sup>1</sup> III-V Lab, route de Nozay, 91461 Marcoussis Cedex, France  
<sup>2</sup> XLIM, 7 rue Jules Valles, 19100 Brive-la-gaillarde, France  
olivier.jardel@3-flab.fr

**Abstract**

We propose here a non-linear GaN HEMT model for CAD including a trapping effects description consistent with both small-signal and large-signal operating modes. It takes into account the dynamics of the traps and then allows to accurately model the modulated large signal characteristics that are encountered in telecommunication and radar signals. This model is elaborated through low-frequency S-parameter measurements complementary to more classical pulsed-IV characterizations. A 8x75 $\mu\text{m}$  AlInN/GaN HEMT model was designed and particularly validated in large-signal pulsed RF operation. It is also shown that thermal and trapping effects have opposite effects on the output conductance, thus opening the way for separate characterizations of the two effects.

**Introduction**

Gallium Nitride (GaN) High Electron Mobility Transistors (HEMT) on SiC are now recognized as good candidates for the development of a number of RF applications and notably Power Amplifiers (PA) for telecommunications and radars, due to their high breakdown voltage, their high cut-off frequency as well as their high temperature capabilities. However they are still subject to parasitics effects such as thermal effects and especially trapping effects. One convenient way to identify the impact of trapping effects is to monitor the average drain current of the transistor

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**I. INTRODUCTION**

Gallium Nitride (GaN) High Electron Mobility Transistors (HEMT) on SiC are now recognized as good candidates for the development of a number of RF applications and notably Power Amplifiers (PA) for telecommunications and radars, due to their high breakdown voltage, their high cut-off frequency as well as their high temperature capabilities. However they are still subject to parasitics effects such as thermal effects and especially trapping effects. One convenient way to identify the impact of trapping effects is to monitor the average drain current of the transistor versus an increasing RF input power. Those trapping effects have been extensively studied using a number of techniques such as pulsed measurements, load-pull measurements as well as frequency dispersion measurements. At the same time, models have been proposed that take those effects into account [1], [2], [3], and while the effects of traps are well taken into account in CW conditions, their impacts on dynamic large signal characteristics remain difficult to understand. They manifest themselves under modulated signals such as RF pulses or telecommunications signals. In this paper we propose to investigate the dynamics of those trapping effects using large signal pulsed load pull measurements as well as low frequency dispersion measurements. It will be shown that a consistent nonlinear model can be obtained that allows to describe the full dynamic behavior of GaN transistors. The paper is organized as follows: Section II describes the theoretical impact of traps on the average current obtained under pulsed load pull conditions. Section III presents the measurements performed on an AlInN/GaN 8x75 $\mu\text{m}$  HEMT and the results

**II. THE IMPACT OF TRAPS ON SIGNAL CHARACTERISTICS**

One convenient way to identify the impact of trapping effects is to monitor the average drain current of the transistor versus an increasing RF input power. It has already been reported in [1] and [3] that this drain current under class-AB conditions decreases as the input power increases, contradicting the expected characteristics. Clearly this behavior cannot be explained by thermal behavior as far as the channel temperature sinks when the power increases and would lead, at least for moderate powers, to an average drain current enlargement.

Figure 1. Representation of the mechanism induced by traps on the average drain current.

Pulsed RF measurements were performed under DC bias on AlGaN/GaN and InAlN/GaN HEMTs of 8x75 $\mu\text{m}^2$  for a large number of output loads. For all devices, we obtain the same shape of the average drain current which is schematized in Figure 1. The average current decrease is due to the trap capture, which increases alike to the gate and drain voltage excursions versus the input power for a CW measurement. Indeed, the number of ionized traps is roughly proportional to the maximum value of the drain-source voltage, because of the dissymmetry of the capture and emission time constants [4]. When the RF power is pulsed, the average drain current

# Edit the underlying LaTeX code directly

The image shows the Overleaf web editor interface. On the left, there is a file explorer with a list of files including 'Compare\_S.pdf', 'Compare\_pulse.pdf', 'Courant\_2.pdf', 'FigureLPancien\_mod.pdf', 'biblio\_traps\_dynamics.bib', and 'main.tex'. Below the file explorer are buttons for 'Download as ZIP' and 'Save to Dropbox'. The main area is split into two panes. The left pane shows the LaTeX source code for a document, starting with `\documentclass{conference}{IEEEtran}` and ending with `\maketitle` and `\begin{abstract}`. The abstract text describes a non-linear GaN HEMT model for CAD. The right pane shows a preview of the document, which is a paper titled 'Modeling of Trap Induced Dispersion of Large Signal Dynamic Characteristics of GaN HEMTs'. The authors listed are O. Jardel, S. Laurent, T. Reveyrand, R. Quéret, P. Nakkala, A. Martin, S. Piotrowicz, M. Campovecchio, S.L. Delage, and Olivier Jardel. The paper includes an abstract, an introduction, and a figure showing the mechanism induced by traps on the average drain current. The figure consists of two plots: the left one shows the average drain current  $I_{D,avg}$  (mA) versus input power  $P_{in}$  (dBm), and the right one shows the average drain current  $I_{D,avg}$  (mA) versus time, illustrating the 'Capture' and 'Emission' phases of a trap.



# In-line comments & track changes for review

The screenshot displays the Overleaf interface with a comparison between two versions of a document. The top navigation bar includes the Overleaf logo, 'PROJECT', 'VERSIONS', and 'COMPARE' buttons, along with a user profile for John Lees-Miller. The interface is split into two panels: 'Current version' on the left and 'Compared version (read only)' on the right.

**Current version:**

- Line 22: **{Introduction}**
- Line 23: (blank)
- Line 24: Your introduction [goes here!](#) Some examples of commonly used commands and features are listed below, to help you get started. If you have a question, please use the help menu (" ?") on the top bar to search for help or ask us a question.

**Comments:**

- John Lees-Miller** about 2 hours ago: Seems punchier. OK?
- John Hammersley** replied about an hour ago: Yep.
- John Lees-Miller** closed this about an hour ago.

**Compared version (read only):**

- Line 1: (blank)
- Line 17: (blank)
- Line 18: **Abstract**
- Line 19: Your abstract.
- Line 20: (blank)
- Line 21: (blank)
- Line 22: **{Introduction}**
- Line 23: (blank)
- Line 24: This is where you write your introduction. Some examples of commonly used commands and features are listed below, to help you get started. If you have a question, please use the help menu (" ?") on the top bar to search for help or ask us a question.
- Line 25: (blank)
- Line 26: **{Some LaTeX Examples}**
- Line 27: (blank)
- Line 28: **{How to Include Figures}**
- Line 29: (blank)
- Line 30: First you have to upload the image file (JPEG, PNG or PDF) from your computer to writeLaTeX using the upload link the project menu. Then use the includegraphics command to include it in your document. Use the figure environment and the caption command to add a number and a caption to your figure. See the code for Figure `\ref{fig:frog}` in this section for an example.
- Line 31: (blank)
- Line 32: `\begin{figure}`
- Line 33: `\centering`
- Line 34: `\includegraphics[width=0.2\textwidth]{frog.jpg}`
- Line 35: (blank)
- Line 36: **{How to Include Figures}**
- Line 37: (blank)



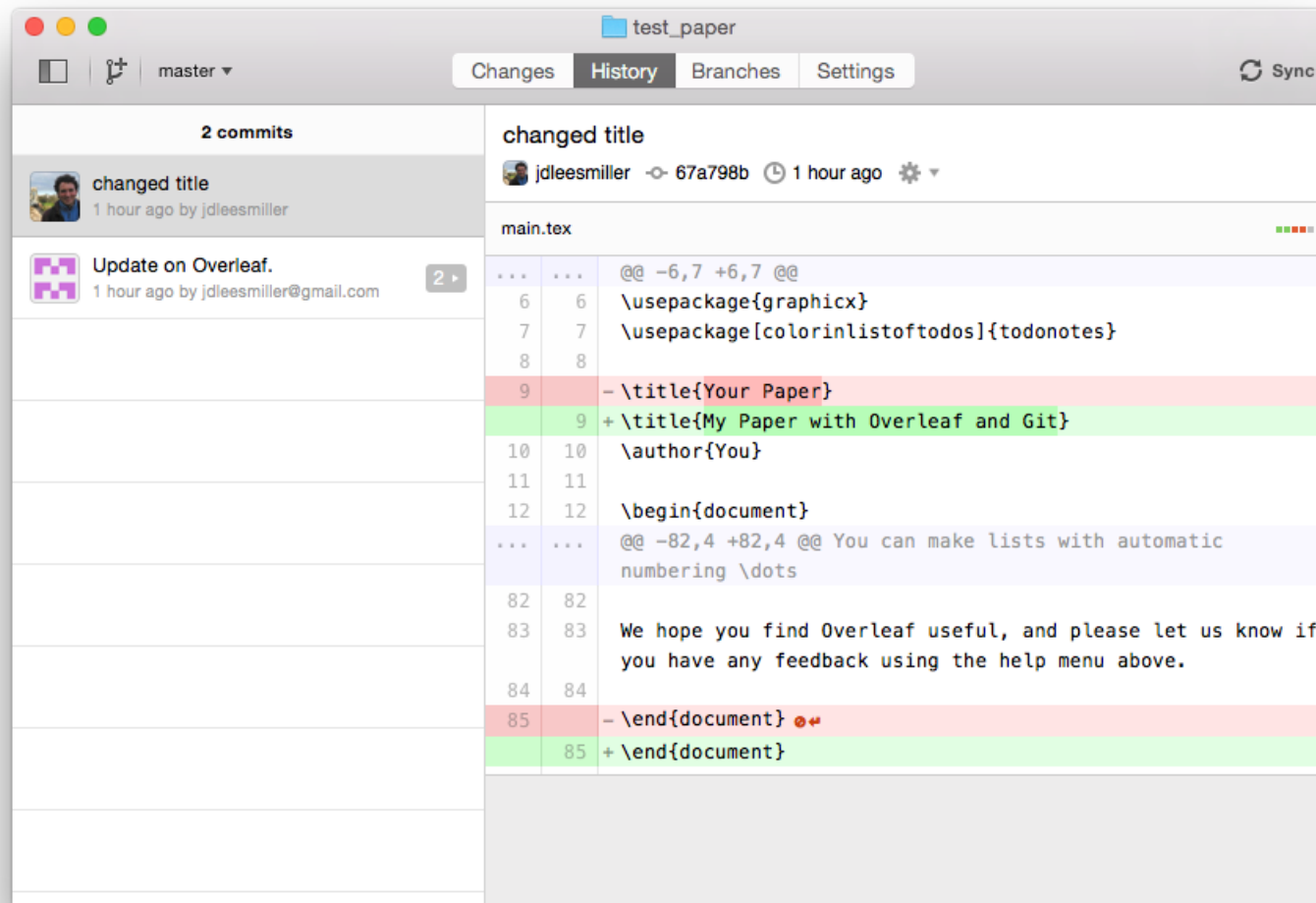
# Connect your existing bibliography database

The screenshot shows the Overleaf web editor interface. On the left, a file list includes 'main.tex' and several PDF files. The central modal window, titled 'Add Bibliography', provides four options:

- CiteULike:** CiteULike is a free service for managing and discovering scholarly references.
- Zotero:** Zotero is a free, easy-to-use tool to help you collect, organize, cite, and share your research sources.
- Mendeley:** Mendeley is a free reference manager and academic social network. Make your own searchable library in seconds.
- Upload a .bib file:** You can upload a BibTeX (.bib) file that you maintain yourself or with another reference manager.

Below the modal, the document content is visible, showing a table of contents with page numbers 42, 43, and 44. The section 'Introduction' is highlighted. The background text includes a paragraph about a stochastic optimization problem and a figure showing a train platform with a queue of passengers.

# Work offline and sync changes with Git



The screenshot shows the Overleaf web interface for a project named "test\_paper". The interface is divided into several sections:

- Header:** Shows the current branch as "master" and navigation tabs for "Changes", "History", "Branches", and "Settings". A "Sync" button is located in the top right corner.
- Commit History (Left Panel):** Displays a list of recent commits. The most recent commit is titled "changed title" by "jdleesmiller" from 1 hour ago. Below it is an "Update on Overleaf" notification from "jdleesmiller@gmail.com" also from 1 hour ago.
- Diff View (Main Panel):** Shows a comparison of the current file "main.tex" against a previous version. The diff highlights changes with colored backgrounds:
  - Line 9: A red background indicates a deletion of the line `\title{Your Paper}`.
  - Line 9: A green background indicates the addition of the line `\title{My Paper with Overleaf and Git}`.
  - Line 85: A red background indicates a deletion of the line `-\end{document}`.
  - Line 85: A green background indicates the addition of the line `+\end{document}`.

# Publish your work directly to journals & repositories...

The screenshot displays the Overleaf web interface. At the top, a dark navigation bar contains the Overleaf logo and several icons: PROJECT, VERSIONS, SHARE, PDF, and PUBLISH. The user's name, John Lees-Miller, is visible in the top right corner. Below the navigation bar, a teal 'Publish' modal window is open, listing several publishing options:

- Overleaf Gallery:** Quick and easy publishing for articles, reports and LaTeX templates and examples, right here on Overleaf. [Submit to Overleaf Gallery](#)
- F1000Research:** The Open Science publishing platform for life scientists with immediate publication and transparent refereeing. [Submit to F1000Research](#)
- PeerJ:** PeerJ is an Open Access publisher of scholarly articles, serving the Biological and Medical sciences. [Submit to PeerJ or PeerJ PrePrints](#)
- figshare:** Get credit for all your research – free repository that makes all your research citable, shareable and discoverable. [Share PDF on figshare](#)
- arXiv.org:** arXiv is an open repository of scientific preprints in fields such as mathematics, physics, astronomy, computer science. [Submit your paper to the arXiv](#)
- bioRxiv:** bioRxiv is a non-profit online archive and distribution service for preprints in the life sciences. [Submit your paper to the bioRxiv](#)
- SCIENTIFIC DATA:** Open-access, peer-reviewed publication for descriptions of research datasets, from Nature Publishing Group. [Submit to Scientific Data](#)
- SCIENTIFIC REPORTS:** Online and open access, Scientific Reports is a primary research publication from the publishers of Nature. [Submit to Scientific Reports](#)

In the background, the document editor shows a LaTeX document with the following visible text:

**Minimizing Average Person**

**Abstract**

1  
39  
40  
41 Personal Rapid Transit (PRT) is an conventional hackney taxi system between stations in a dedicated network operating in 2010 and 2011. In both not book ahead. Perfect information information about future requests statistical information to position waiting times result, which makes difficult stochastic optimisation passenger waiting time, one based assumed that perfect information evaluation of these lower bounds, shows that these lower bounds results also show that low waiting fleet size is large, which suggests

42

43  
44 **Introduction**

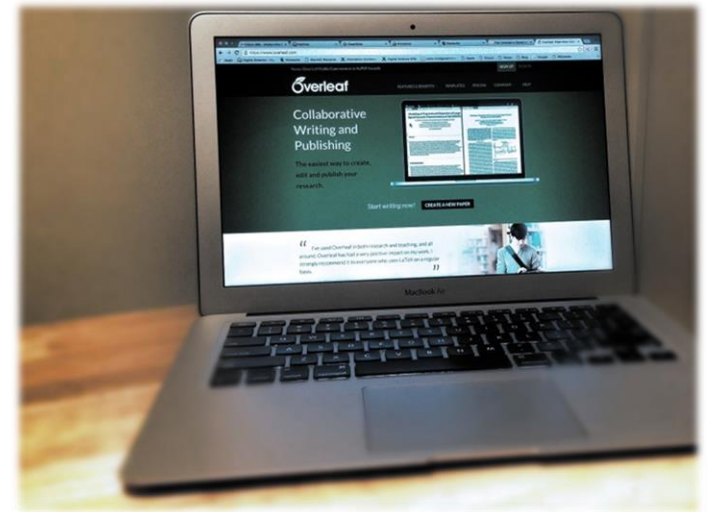
45 Personal Rapid Transit (PRT) is an computer-guided vehicles to carry stations on a dedicated network of

46  
47  
48

On the right side of the interface, a preview of the document is visible, showing a diagram of a PRT system and a warning icon.

# Summary

- One version of the document, accessible by all
- No need to email files – simply share the link
- Typesetting done automatically in the background while you type
- Automatic reference styles & citation links
- Review tools allow others real-time commenting directly on the document
- No software installation required



If you're new to LaTeX, try Part 1 of our online course:  
<https://www.overleaf.com/latex/learn/free-online-introduction-to-latex-part-1>

If you're familiar with LaTeX, try writing up part of a paper or project you're working on using a template from [www.overleaf.com/latex/templates](https://www.overleaf.com/latex/templates)





# Getting more out of Overleaf



# Reference management



## Reference management

- Tools such as ReadCube, Zotero and Mendeley make it easy to keep a central database of references.

zotero



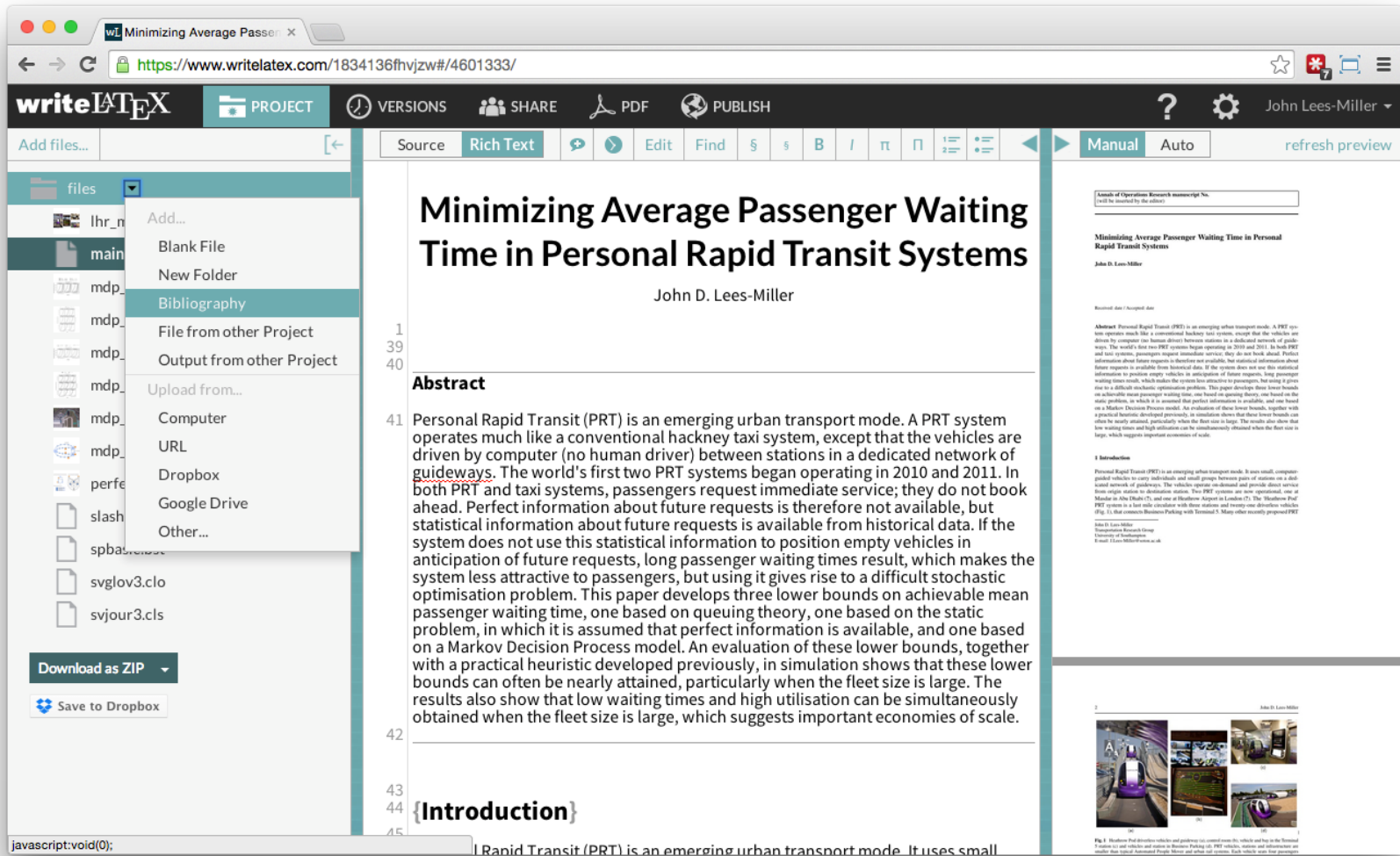
readcube



MENDELEY

Overleaf

# 1. Click the 'Add Bibliography' option in the Project menu



The screenshot shows the WriteLaTeX web interface. The browser address bar displays the URL <https://www.writelatex.com/1834136fvjzdw#/4601333/>. The interface includes a top navigation bar with 'writeLATEX', 'PROJECT', 'VERSIONS', 'SHARE', 'PDF', and 'PUBLISH' buttons. A user profile for 'John Lees-Miller' is visible in the top right. A left sidebar shows a file explorer with a 'files' dropdown menu open, highlighting the 'Bibliography' option. The main content area displays the title 'Minimizing Average Passenger Waiting Time in Personal Rapid Transit Systems' by John D. Lees-Miller. The document text is visible, including the abstract and the start of the introduction. The abstract discusses Personal Rapid Transit (PRT) as an emerging urban transport mode and the challenges of minimizing waiting times. The introduction begins by describing PRT as a small, computer-guided vehicle system. The interface also shows a 'Manual' and 'Auto' toggle, a 'refresh preview' button, and a 'Download as ZIP' button in the sidebar.

Minimizing Average Passenger Waiting Time in Personal Rapid Transit Systems

John D. Lees-Miller

**Abstract**

Personal Rapid Transit (PRT) is an emerging urban transport mode. A PRT system operates much like a conventional hackney taxi system, except that the vehicles are driven by computer (no human driver) between stations in a dedicated network of guideways. The world's first two PRT systems began operating in 2010 and 2011. In both PRT and taxi systems, passengers request immediate service; they do not book ahead. Perfect information about future requests is therefore not available, but statistical information about future requests is available from historical data. If the system does not use this statistical information to position empty vehicles in anticipation of future requests, long passenger waiting times result, which makes the system less attractive to passengers. In using a practical heuristic developed previously, in simulation shows that these lower bounds can often be nearly attained, particularly when the fleet size is large. The results also show that low waiting times and high utilisation can be simultaneously obtained when the fleet size is large, which suggests important economies of scale.

**Introduction**

Personal Rapid Transit (PRT) is an emerging urban transport mode. It uses small, computer-guided vehicles to carry individuals and small groups between pairs of stations on dedicated networks of guideways. The vehicles operate on-demand and provide direct service from origin to destination stations. Two PRT systems are now operational: one at Mander in Abu Dhabi (7), and one at Heathrow Airport in London (7). The Heathrow PRT system is a fast-rail connection with three stations and heavy-duty direction vehicles (Fig. 1) that connects Business Parking with Terminal 5. Many other recently proposed PRT

## 2. Choose where to import your bibliography from

The screenshot shows a web browser window with the URL <https://www.writelatex.com/1834136fhvzlw#/4601333/>. The page title is "Minimizing Average Passenger Waiting Time in Personal Rapid Transit Systems" by John Lees-Miller. A modal dialog box titled "Add Bibliography" is open, offering four options:

- CiteULike:** CiteULike is a free service for managing and discovering scholarly references. [Add CiteULike bibliography](#)
- Zotero:** Zotero is a free, easy-to-use tool to help you collect, organize, cite, and share your research sources. [Add Zotero bibliography](#)
- Mendeley:** Mendeley is a free reference manager and academic social network. Make your own searchable library in seconds. [Add Mendeley bibliography](#)
- Upload a .bib file:** You can upload a BibTeX (.bib) file that you maintain yourself or with another reference manager. [Upload a .bib file](#)

Below the dialog, the document text is visible, starting with the introduction:

42  
43  
44 **{Introduction}**  
45  
46 Personal Rapid Transit (PRT) is an emerging urban transport mode. It uses small

The document text continues: "system less attractive to passengers, but using it gives rise to a difficult stochastic optimisation problem. This paper develops three lower bounds on achievable mean passenger waiting time, one based on queuing theory, one based on the static problem, in which it is assumed that perfect information is available, and one based on a Markov Decision Process model. An evaluation of these lower bounds, together with a practical heuristic developed previously, in simulation shows that these lower bounds can often be nearly attained, particularly when the fleet size is large. The results also show that low waiting times and high utilisation can be simultaneously obtained when the fleet size is large, which suggests important economies of scale."

# 3. The first time you do this you'll need to connect your accounts

The screenshot shows a web browser window displaying a LaTeX Beamer presentation. The browser's address bar shows the URL <https://www.writelatex.com/1834136fhvzjw#/4601333/>. The page title is "Minimizing Average Passenger Waiting Time in Personal Rapid Transit Systems".

A modal dialog box titled "Add Bibliography from Mendeley" is centered on the screen. It contains the text: "To access your bibliography on Mendeley, you need to give us read access to your Mendeley account." Below the text is a button labeled "CONNECT MY MENDELEY ACCOUNT".

The background presentation content is partially visible. The "Abstract" section (lines 41-42) reads: "Personal Rapid Transit (PRT) is an emerging urban transport mode. A PRT system operates much like a conventional hackney taxi system, except that the vehicles are driven by computer (no human driver) between stations in a dedicated network of guideways. The world's first two PRT systems began operating in 2010 and 2011. In both PRT and taxi systems, passengers request immediate service; they do not book ahead. Perfect information about future requests is therefore not available, but statistical information about future requests is available from historical data. If the system does not use this statistical information to position empty vehicles in anticipation of future requests, long passenger waiting times result, which reduces the system's attractiveness to passengers. In using a precise but a difficult stochastic optimisation problem. This paper develops three lower bounds on achievable mean passenger waiting times: one based on queuing theory, one based on the static problem, in which it is assumed that perfect information is available, and one based on a Markov Decision Process model. An evaluation of these lower bounds, together with a practical heuristic developed previously, in simulation shows that these lower bounds can often be nearly attained, particularly when the fleet size is large. The results also show that low waiting times and high utilisation can be simultaneously obtained when the fleet size is large, which suggests important economies of scale."


The "Introduction" section (lines 43-44) begins with: "Personal Rapid Transit (PRT) is an emerging urban transport mode. It uses small, computer-guided vehicles to carry individuals and small groups between pairs of stations on a dedicated network of guideways. The vehicles operate on-demand and provide direct service from origin stations to destination stations. Two PRT systems are now operational: one at Mankato in Minnesota (1), and one at Heathrow Airport in London (2). The Heathrow PRT system is a fast-rail system with three stations and heavy-duty driverless vehicles (Fig. 1). It connects Business Parking with Terminal 5. Many other recently proposed PRT systems are also shown in Fig. 2. Many other recently proposed PRT systems are also shown in Fig. 2. Many other recently proposed PRT systems are also shown in Fig. 2."

At the bottom of the browser window, a small code snippet is visible: `javascript:void(0);`

## 4. Authorize the connection if required

Minimizing Average Passer x Mendeley Authorization x

https://mix.mendeley.com/oauth/authorize?client\_id=348&redirect\_uri=https%3A%2F%2Fwww.writelatex.com%2Fusers%2Fauth%2Fmendeley%2Fcallback&r...

 MENDELEY

WriteLaTeX is requesting the ability to access and update data from your Mendeley account.

Email

Password

[Authorize](#)

[Forgot your password?](#)



# 5. Choose a name for the .bib file in your project

The screenshot shows a web browser window with the URL <https://www.writelatex.com/1834136fhjzww/4601333/>. The page title is "Minimizing Average Passenger Waiting Time in Personal Rapid Transit Systems". The interface includes a navigation bar with "PROJECT", "VERSIONS", "SHARE", "PDF", and "PUBLISH" buttons. A modal dialog titled "Add Bibliography from Mendeley" is open, with the text "We will fetch your entire Mendeley library as a BibTeX file." and a form for "Name of the file in this project:" containing the text "refs.bib". Below the dialog, the document content is visible, starting with an "Abstract" section. The abstract text reads: "Personal Rapid Transit (PRT) is an emerging urban transport mode. A PRT system operates much like a conventional hackney taxi system, except that the vehicles are driven by computer (no human driver) between stations in a dedicated network of guideways. The world's first two PRT systems began operating in 2010 and 2011. In both PRT and taxi systems, passengers request immediate service; they do not book ahead. Perfect information about future requests is therefore not available, but statistical information about future requests is available from historical data. If the system does not use this information to position empty vehicles in anticipation of future requests, long passenger waiting times result, which reduce the system's attractiveness to passengers. We bring a problem to a difficult stochastic optimization problem. This paper develops three lower bounds on achievable mean passenger waiting times: one based on queuing theory, one based on the static problem, in which it is assumed that perfect information is available, and one based on a Markov Decision Process model. An evaluation of these lower bounds, together with a practical heuristic developed previously, in simulation shows that these lower bounds can often be nearly attained, particularly when the fleet size is large. The results also show that low waiting times and high utilisation can be simultaneously obtained when the fleet size is large, which suggests important economies of scale."

41 Personal Rapid Transit (PRT) is an emerging urban transport mode. A PRT system operates much like a conventional hackney taxi system, except that the vehicles are driven by computer (no human driver) between stations in a dedicated network of guideways. The world's first two PRT systems began operating in 2010 and 2011. In both PRT and taxi systems, passengers request immediate service; they do not book ahead. Perfect information about future requests is therefore not available, but statistical information about future requests is available from historical data. If the system does not use this statistical information to position empty vehicles in anticipation of future requests, long passenger waiting times result, which makes the system less attractive to passengers, but using it gives rise to a difficult stochastic optimisation problem. This paper develops three lower bounds on achievable mean passenger waiting time, one based on queuing theory, one based on the static problem, in which it is assumed that perfect information is available, and one based on a Markov Decision Process model. An evaluation of these lower bounds, together with a practical heuristic developed previously, in simulation shows that these lower bounds can often be nearly attained, particularly when the fleet size is large. The results also show that low waiting times and high utilisation can be simultaneously obtained when the fleet size is large, which suggests important economies of scale.

42

43

44 **{Introduction}**

45

46 Personal Rapid Transit (PRT) is an emerging urban transport mode. It uses small

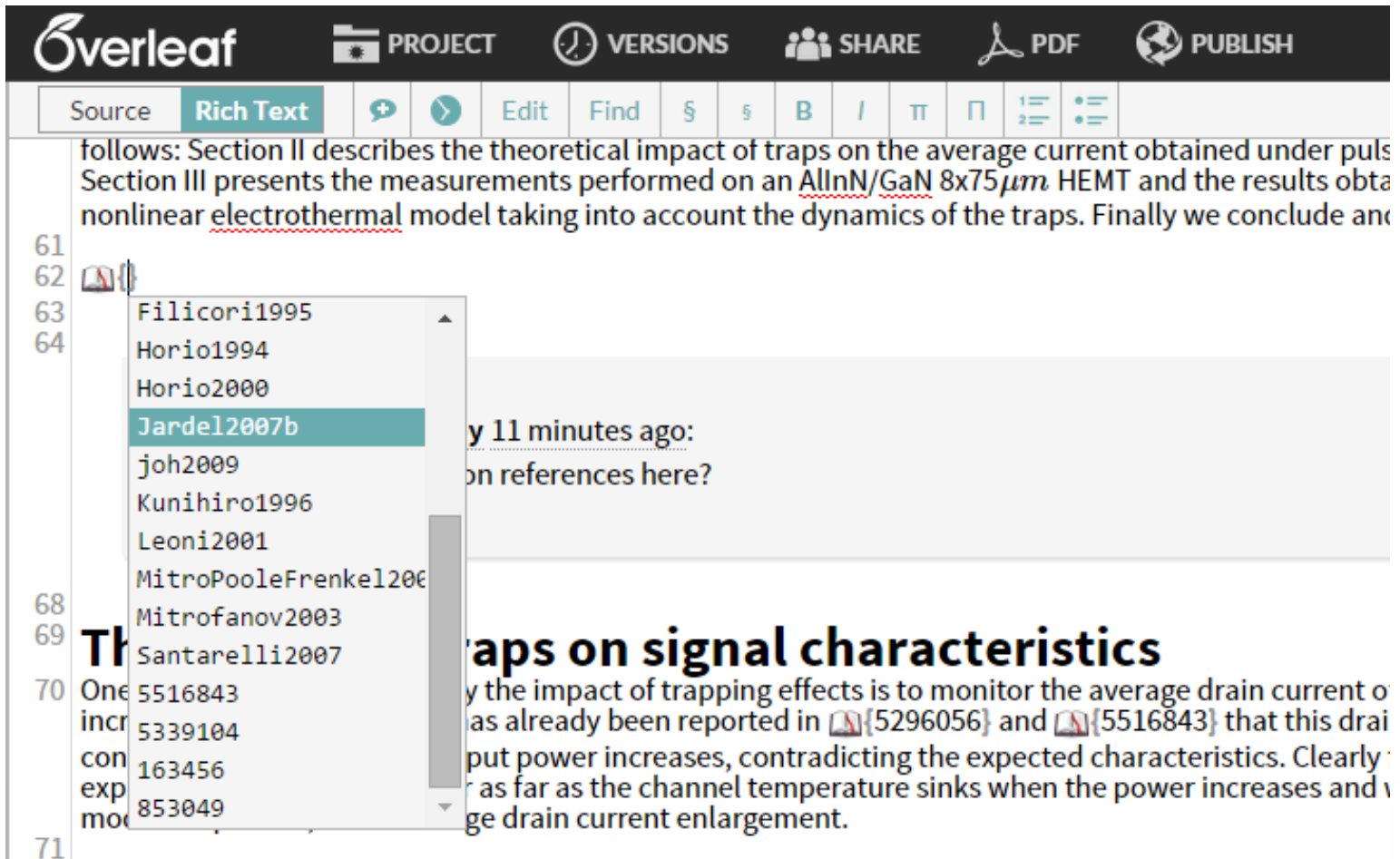
## 6. The .bib file can be used as normal. Click refresh to sync.

The screenshot shows the WriteLaTeX web interface. The browser address bar displays the URL: <https://www.writelatex.com/1834136fhvzjw#/4601333/3725511/>. The interface includes a navigation bar with options like PROJECT, VERSIONS, SHARE, PDF, and PUBLISH. A file explorer on the left shows a list of files, with 'refs.bib' selected. The main editor area displays LaTeX code for a bibliography, including entries for 'Shen2009Stochastic', 'Imrak2008Artificial', 'Hackner1995Deregulating', and 'Gaver1970Comparison'. A modal window is open over the code, showing a snippet of the first entry. At the bottom of the editor, there is a '(refresh)' button and a green 'X' icon.

```
1 @incollection{Shen2009Stochastic,
2   title = {The Stochastic Vehicle Routing Problem for Minimum Unmet
3   Demand},
4   year = {2009},
5   booktitle = {Optimization and Logistics Challenges in the
6   Enterprise},
7   author = {Shen, Zhihong and Ord{\`{o}}{\`{n}}ez, Fernando and
8   Dessouky, Maged M},
9   doi = {10.1007/978-0-387-88617-6{\_}{13}},
10  pages = {349-371}
11 }
12 @article{Imrak2008Artificial,
13   title = {Artificial neural networks application in Duplex/Triplex
14   elevator group control system},
15   year = {2008},
16   journal = {Strojnicki Vestnik-Journal of Mechanical Engineering},
17   author = {Imrak, C E},
18   number = {2},
19   volume = {54}
20 }
21 @article{Hackner1995Deregulating,
22   title = {Deregulating Taxi Services: A Word of Caution},
23   year = {1995},
24   journal = {Journal of Transport Economics and Policy},
25   author = {H{\`{a}}ckner, Jonas and Nyberg, Sten},
26   doi = {10.2307/20053073},
27   number = {2},
28   volume = {29}
29 }
30 @article{Gaver1970Comparison,
31   title = {Comparison of Certain Small-Sample Poisson Probability
32   Estimates},
33   year = {1970},
34   journal = {Technometrics},
35   author = {Gaver, Donald P and Hoel, David G},
36   doi = {10.2307/1267329},
37   number = {4},
38   pages = {835-850},
39   volume = {12}
40 }
```

Fig. 7. Screenshot of the WriteLaTeX web interface showing the .bib file being edited and the refresh button.

## 7. To cite a reference, use the `\cite{}` command





The screenshot shows the Overleaf LaTeX editor interface. At the top, there is a navigation bar with icons for PROJECT, VERSIONS, SHARE, PDF, and PUBLISH. Below this is a toolbar with icons for Source, Rich Text, and various editing tools. The main text area contains a paragraph of text with a citation command `\cite{}` being edited. A dropdown menu is open, showing a list of references with `Jarde12007b` selected. The text in the background is partially obscured by the dropdown menu.

61 follows: Section II describes the theoretical impact of traps on the average current obtained under puls  
62 Section III presents the measurements performed on an AllnN/GaN 8x75 $\mu$ m HEMT and the results obta  
63 nonlinear electrothermal model taking into account the dynamics of the traps. Finally we conclude and  
64

65 y 11 minutes ago:  
66 on references here?

67

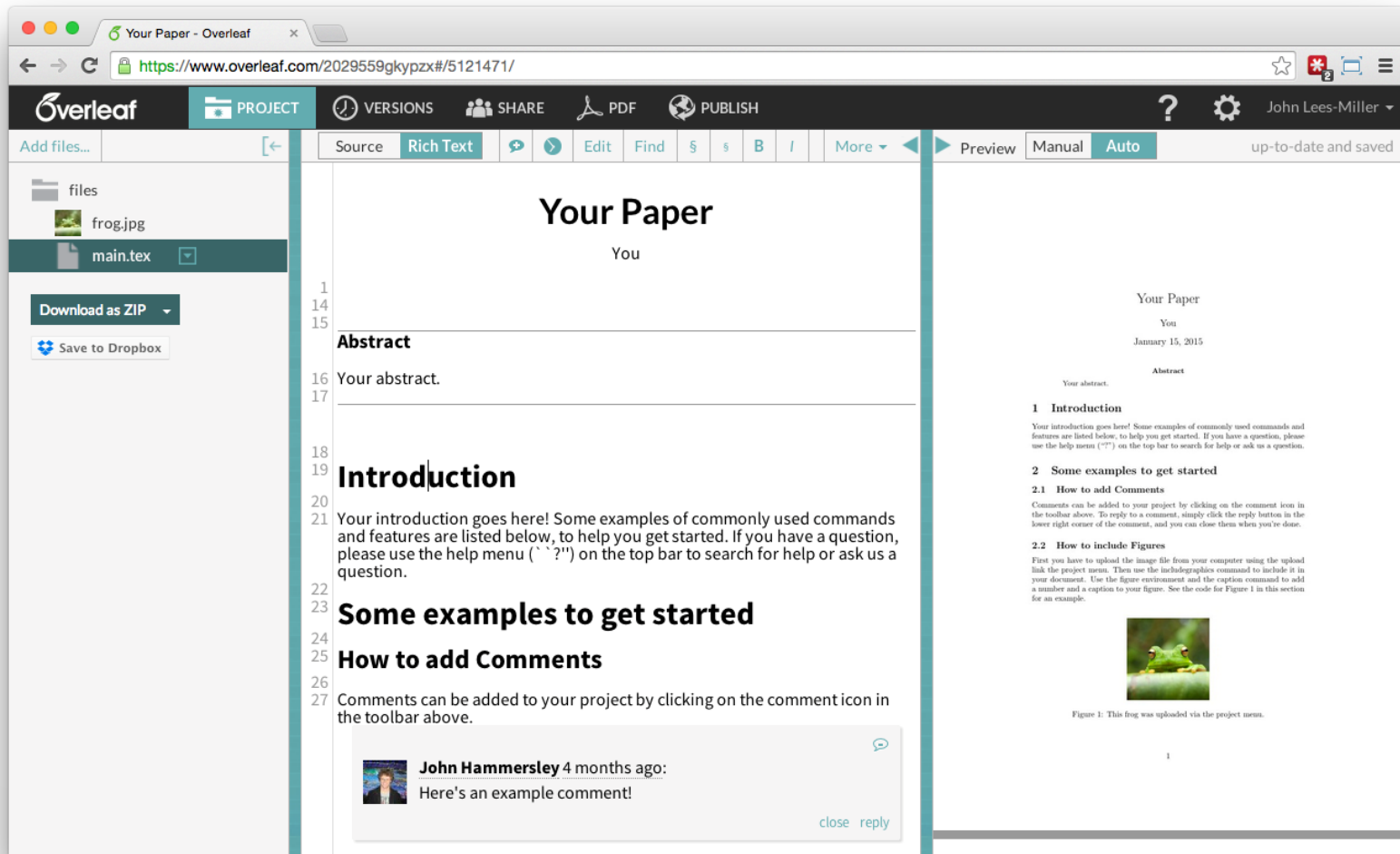
68 **Traps on signal characteristics**

69 by the impact of trapping effects is to monitor the average drain current of  
70 as already been reported in `{5296056}` and `{5516843}` that this drai  
71 con put power increases, contradicting the expected characteristics. Clearly  
exp r as far as the channel temperature sinks when the power increases and v  
mod ge drain current enlargement.

# Offline sync with Git



# 1. Create (or open) a project on Overleaf



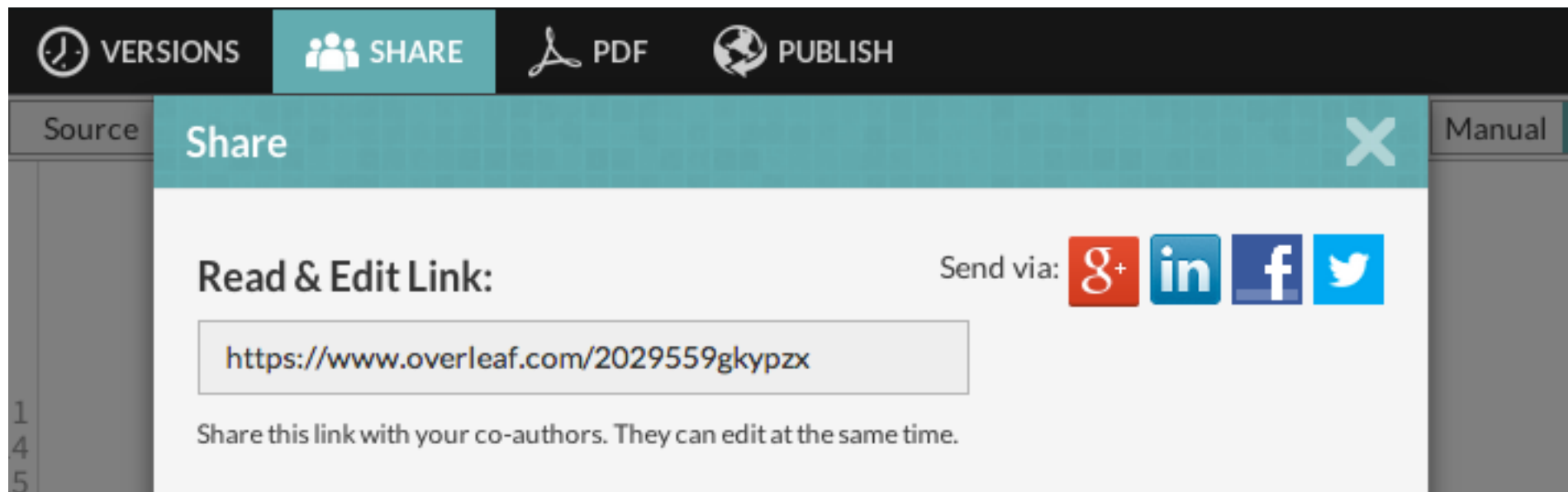
The screenshot displays the Overleaf web interface for a project titled "Your Paper". The browser address bar shows the URL <https://www.overleaf.com/2029559gkypzx#/5121471/>. The user is identified as John Lees-Miller.

The interface is divided into several sections:

- Left Panel (File Manager):** Shows a file tree with "files", "frog.jpg", and "main.tex". A "Download as ZIP" button and a "Save to Dropbox" link are visible.
- Top Bar:** Contains navigation and utility icons for "VERSIONS", "SHARE", "PDF", and "PUBLISH". The user's name "John Lees-Miller" is on the right.
- Editor:** The main workspace is split into "Source" (code) and "Rich Text" (preview) views. The "Rich Text" view is active, showing the document content. The code on the left includes:

```
1  
14  
15  
16 Abstract  
17 Your abstract.  
18  
19 Introduction  
20  
21 Your introduction goes here! Some examples of commonly used commands  
22 and features are listed below, to help you get started. If you have a question,  
23 please use the help menu (``?``) on the top bar to search for help or ask us a  
24 question.  
25  
26 Some examples to get started  
27  
28 How to add Comments  
29  
30 Comments can be added to your project by clicking on the comment icon in  
31 the toolbar above.
```
- Right Panel (Preview):** Shows the rendered PDF output of the document, including the title "Your Paper", author "You", date "January 15, 2015", and the content of the sections mentioned in the code.
- Bottom Panel (Comments):** A comment from John Hammersley, posted 4 months ago, reads: "Here's an example comment!".

## 2. Find the Git link for your project

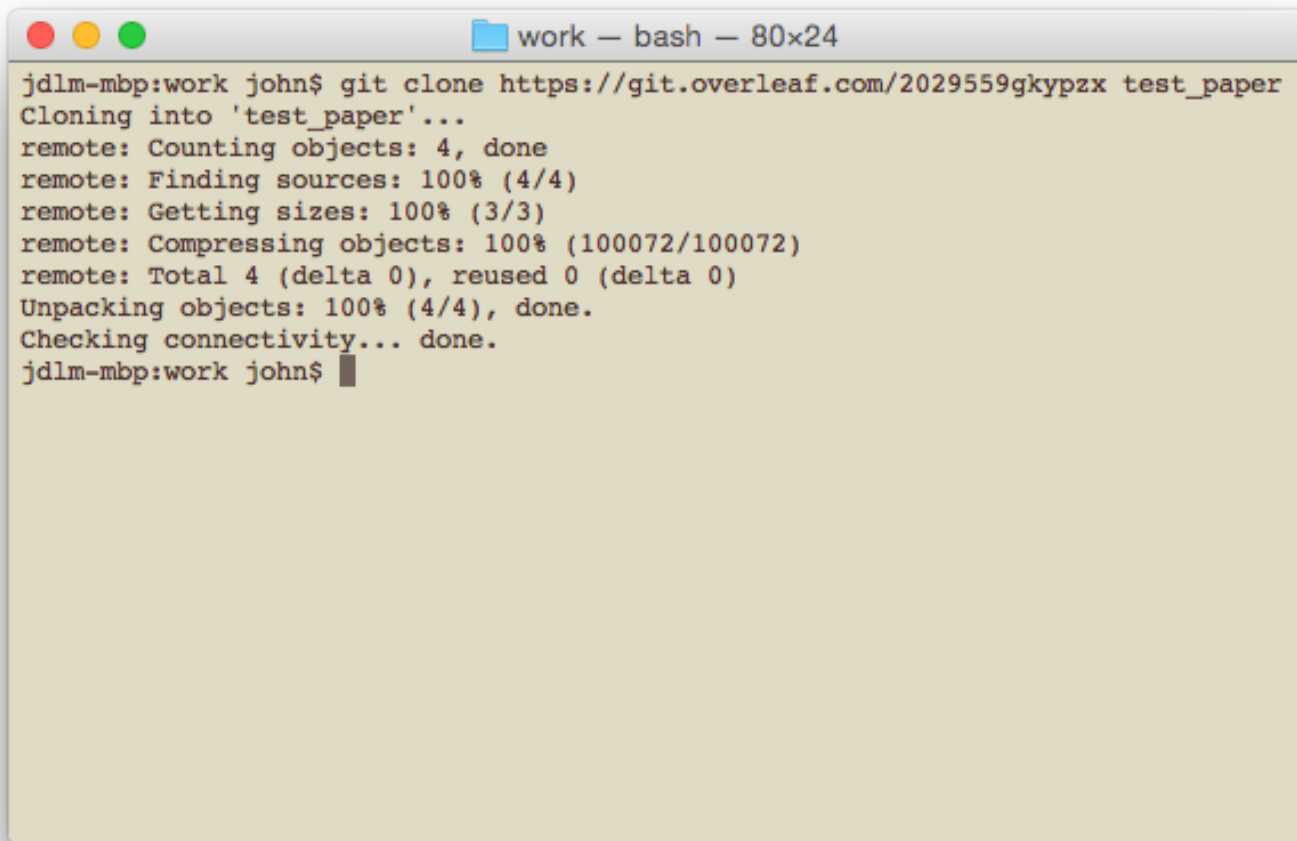


The screenshot shows the 'Share' dialog box in Overleaf. At the top, there are navigation tabs: 'VERSIONS', 'SHARE' (which is active), 'PDF', and 'PUBLISH'. Below the tabs, the dialog has a teal header with the word 'Share' and a close button. The main content area displays 'Read & Edit Link:' followed by a text box containing the URL <https://www.overleaf.com/2029559gkypzx>. To the right of the text box, there is a 'Send via:' label and four social media icons: Google+, LinkedIn, Facebook, and Twitter. Below the text box, there is a note: 'Share this link with your co-authors. They can edit at the same time.'

In this case, the project link is <https://www.overleaf.com/2029559gkypzx>, so its git link is <https://git.overleaf.com/2029559gkypzx>.



### 3. Clone your project with Git

A terminal window titled "work — bash — 80x24" showing the execution of a git clone command. The output shows the progress of cloning a repository from https://git.overleaf.com/2029559gkypzx to a local directory named "test\_paper". The process includes counting objects, finding sources, getting sizes, compressing objects, and unpacking objects, all of which are completed successfully. The terminal prompt returns to the user's shell.

```
jdmlm-mbp:work john$ git clone https://git.overleaf.com/2029559gkypzx test_paper
Cloning into 'test_paper'...
remote: Counting objects: 4, done
remote: Finding sources: 100% (4/4)
remote: Getting sizes: 100% (3/3)
remote: Compressing objects: 100% (100072/100072)
remote: Total 4 (delta 0), reused 0 (delta 0)
Unpacking objects: 100% (4/4), done.
Checking connectivity... done.
jdmlm-mbp:work john$
```

## 4. Edit your project and commit your changes



```
test_paper -- vim -- 80x24
1 \documentclass[a4paper]{article}
2
3 \usepackage[english]{babel}
4 \usepackage[utf8x]{inputenc}
5 \usepackage{amsmath}
6 \usepackage{graphicx}
7 \usepackage[colorinlistoftodos]{todonotes}
8
9 \title{My Paper with Overleaf and Git}
10 \author{You}
11
12 \begin{document}
13 \maketitle
14
15 \begin{abstract}
16 Your abstract.
17 \end{abstract}
18
19 \section{Introduction}
20
e
e
e
-- INSERT --          9,38          Top
```

## 5. Push your changes to Overleaf

```
test_paper — bash — 80x24
remote: Finding sources: 100% (4/4)
remote: Getting sizes: 100% (3/3)
remote: Compressing objects: 100% (100072/100072)
remote: Total 4 (delta 0), reused 0 (delta 0)
Unpacking objects: 100% (4/4), done.
Checking connectivity... done.
jdmlm-mbp:work john$ cd test_paper
jdmlm-mbp:test_paper john$ ls
frog.jpg  main.tex
jdmlm-mbp:test_paper john$ vi main.tex
jdmlm-mbp:test_paper john$ git commit -am "changed title"
[master 67a798b] changed title
 1 file changed, 2 insertions(+), 2 deletions(-)
jdmlm-mbp:test_paper john$ git push
Counting objects: 3, done.
Delta compression using up to 4 threads.
Compressing objects: 100% (3/3), done.
Writing objects: 100% (3/3), 347 bytes | 0 bytes/s, done.
Total 3 (delta 1), reused 0 (delta 0)
remote: Resolving deltas: 100% (1/1)
remote: Updating references: 100% (1/1)
To https://git.overleaf.com/2029559gkypzx
 2f43246..67a798b  master -> master
jdmlm-mbp:test_paper john$ █
```

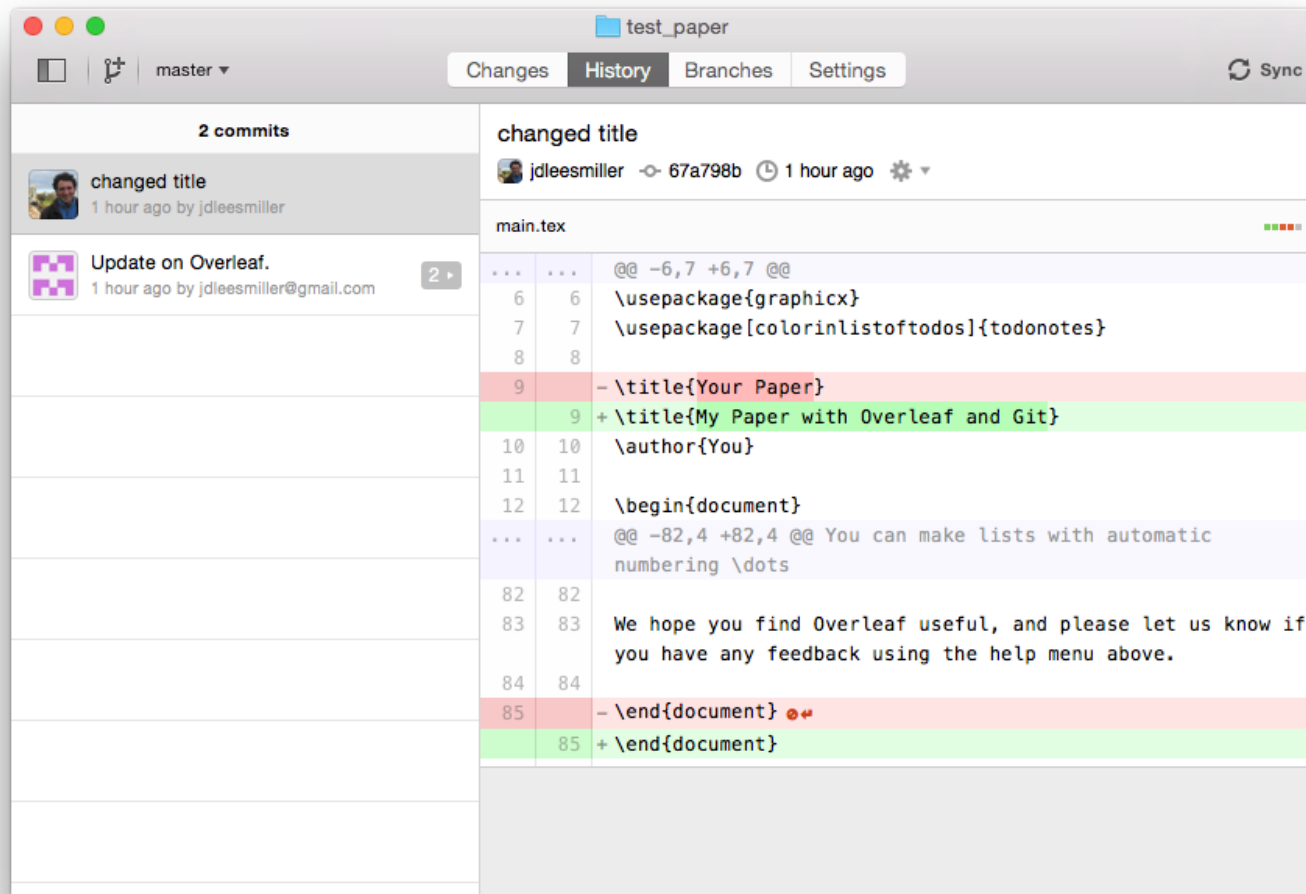
# 6. See the results online

The screenshot displays the Overleaf web interface for a project named "Your Paper - Overleaf". The browser address bar shows the URL <https://www.overleaf.com/2029559gkypzx#/5121471/>. The user is identified as "John Lees-Miller".

The interface is divided into several sections:

- Left Panel:** A file explorer showing a folder named "files" containing "frog.jpg" and "main.tex". Below the files, there are buttons for "Download as ZIP" and "Save to Dropbox".
- Top Bar:** Contains navigation and utility icons for "Source", "Rich Text", "Edit", "Find", "B", "I", and "More". It also includes "VERSIONS", "SHARE", "PDF", and "PUBLISH" options.
- Editor:** The main workspace shows the source code of the document. The title is "My Paper with Overleaf and Git" and the author is "You". The code includes sections for "Abstract", "Introduction", "Some examples to get started", and "How to add Comments".
- Right Panel:** A preview window showing the rendered document. The title and author are "My Paper with Overleaf and Git" and "You", dated "January 15, 2015". The content includes the same sections as the source code, with a small image of a frog (Figure 1) included in the "How to include Figures" section.
- Bottom Panel:** A comment section showing a comment from "John Hammersley" 4 months ago: "Here's an example comment!".

# Option: Use graphical Git clients



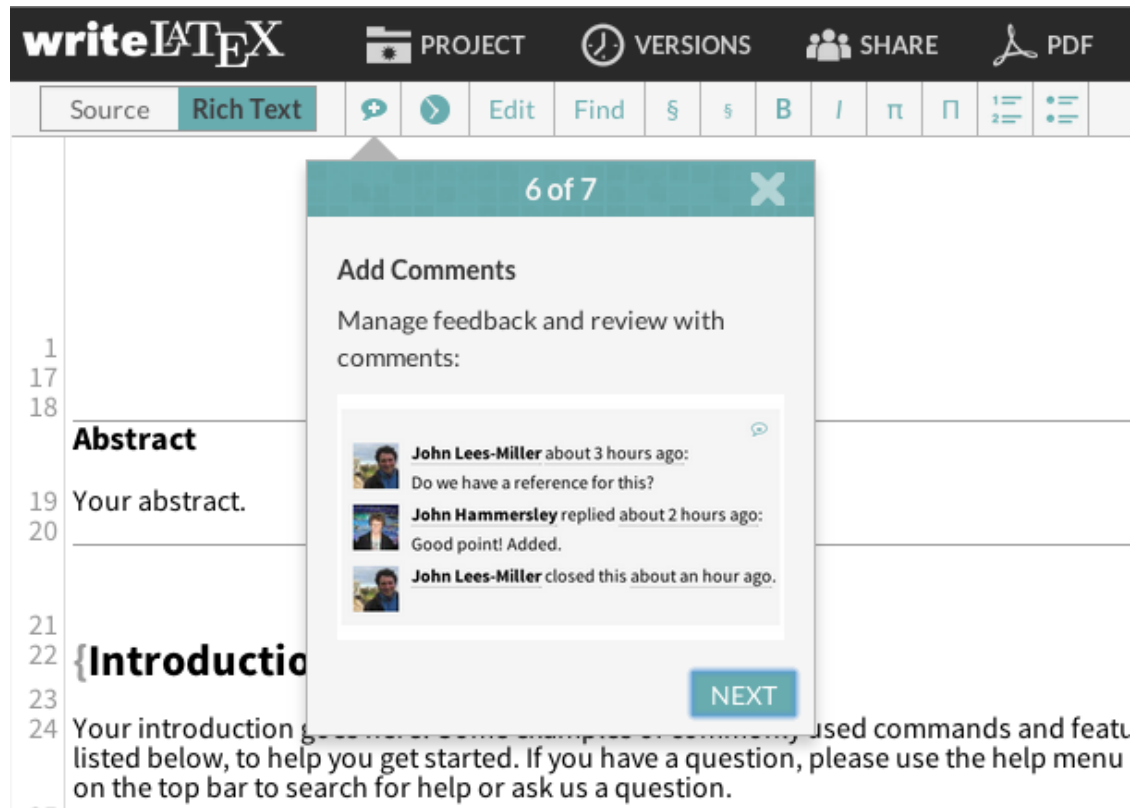
Adding, replying-to, and closing comments





# Adding comments and feedback

- It's often necessary to get feedback from colleagues
- Many online tools now offer integrated commenting



The screenshot displays the Overleaf web interface for editing a LaTeX document. The top navigation bar includes the 'write<sup>L</sup>A<sup>T</sup>E<sup>X</sup>' logo and icons for PROJECT, VERSIONS, SHARE, and PDF. Below this is a toolbar with 'Source' and 'Rich Text' tabs, and various editing tools like undo, redo, edit, find, bold, italic, and list. The document content is shown in a scrollable area with line numbers on the left. The 'Abstract' section (lines 19-20) contains the text 'Your abstract.' The 'Introduction' section (lines 22-24) contains the text 'Your introduction g... used commands and featu... listed below, to help you get started. If you have a question, please use the help menu on the top bar to search for help or ask us a question.'

A modal dialog box titled 'Add Comments' is open over the document. It has a close button (X) in the top right corner and a '6 of 7' indicator. The dialog contains the text 'Manage feedback and review with comments:' and a list of three comments:


- John Lees-Miller** about 3 hours ago: Do we have a reference for this?
- John Hammersley** replied about 2 hours ago: Good point! Added.
- John Lees-Miller** closed this about an hour ago.

A 'NEXT' button is located at the bottom right of the dialog box.

# Adding comments and feedback

- Simply click the "Add comment" button on the editor toolbar, and type your comment in the box that appears.
- It'll then be inserted into the document:

21  
22 **{Introduction}**  
23  
24 Your introduction goes here! Some examples of commonly used commands and features are listed below, to help you get started. If you have a question, please use the help menu (``?") on the top bar to search for help or ask us a question.



**John Hammersley** about a minute ago:  
This introduction is too short!

close reply

# Adding comments and feedback

- You can reply to comments left by your collaborators by clicking on the "reply" option at the foot of their comment:

21  
22  
23  
24

## {Introduction}

Your introduction goes here! Some examples of commonly used commands and features are listed below, to help you get started. If you have a question, please use the help menu (" ?") on the top bar to search for help or ask us a question.



**John Hammersley** 11 minutes ago:

This introduction is too short!



**John Lees-Miller** replied 5 minutes ago:

That's because this is just a demo!




close reply

# Adding comments and feedback

- It appears as a nested comment, and you can close the comments when you're done. To re-open any closed comments, simply click the comment icon in the document.

21  
22  
23  
24  
33  
34  
25

**{Introduction}**

Your introduction goes here! Some examples of commonly used commands and features are listed below, to help you get started. If you have a question, please use the help menu (" ?") on the top bar to search for help or ask us a question. 

**{Some**

Other: Tables, Plots and Symbols



# Table generator - <http://www.tablesgenerator.com/>

- An easy way to generate LaTeX tables:

Name	Grade	Position
Alice	90	1
Bob	85	2
Charlie	74	3

Latex

Comma separated values

JSON

Markdown

HTML

BBCode

Balsamiq

Wiki markup

SQL

Mathematica

Plain text

No output

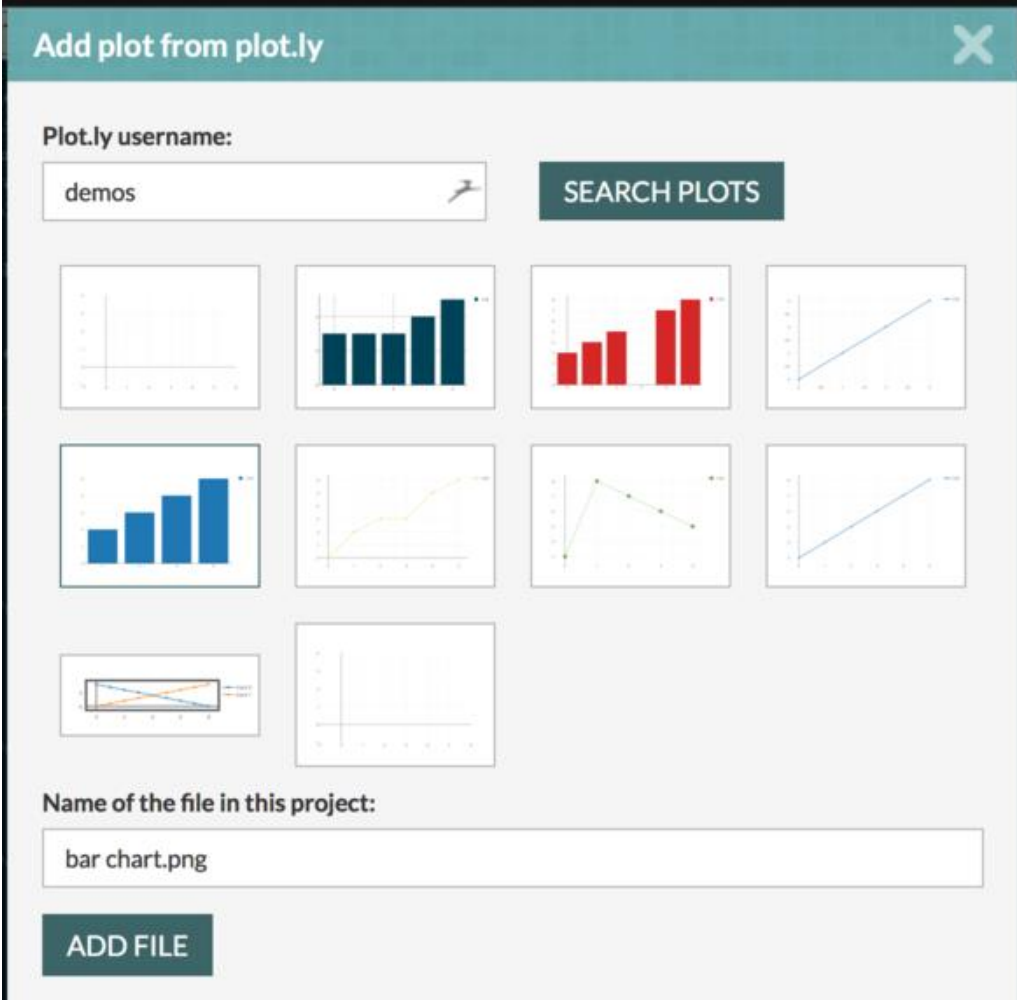
Output options ▼

```
\begin{table}
  \begin{tabular}{lll}
    Name & Grade & Position \\
    Alice & 90 & 1 \\
    Bob & 85 & 2 \\
    Charlie & 74 & 3 \\
  \end{tabular}
\end{table}
```



# Adding Plots from plot.ly

- Import your plots from plot.ly directly into Overleaf
- Choose the 'Add plot from plot.ly' in the Project menu
- Enter your plot.ly username, and search your plots.



The screenshot shows a dialog box titled "Add plot from plot.ly" with a close button (X) in the top right corner. Below the title, there is a "Plot.ly username:" label followed by a text input field containing "demos" and a small icon of a person. To the right of the input field is a dark green button labeled "SEARCH PLOTS". Below this, there is a grid of 11 plot thumbnails. The first row contains four plots: a blank coordinate system, a bar chart with four blue bars, a bar chart with four red bars, and a line graph with a blue line. The second row contains four plots: a bar chart with four blue bars, a line graph with a yellow line, a line graph with a green line, and a line graph with a blue line. The third row contains two plots: a line graph with a blue line and a yellow line, and a blank coordinate system. Below the grid, there is a "Name of the file in this project:" label followed by a text input field containing "bar chart.png". At the bottom left, there is a dark green button labeled "ADD FILE".

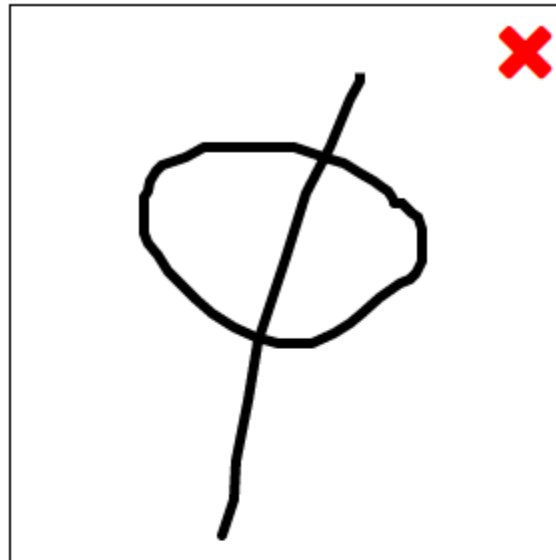
## Find symbols:

- Just draw the symbol you'd like to use in your document
- Detexify finds it for you

## Detexify

classify

symbols



### What is this?

Anyone who works with LaTeX knows how time-consuming it can be to find a symbol in [symbols-a4.pdf](#) that you just can't memorize. Detexify is an attempt to simplify this search.

### How do I use it?

Just draw the symbol you are looking for into the square area above and look what happens!

$\Phi$

Score: 0.1166896560018173

`\usepackage{ tipa }`  
`\textphi`  
textmode

$\emptyset$

Score: 0.11936450077023789

`\emptyset`  
mathmode

$\phi$

Score: 0.12435361371183157

`\phi`  
mathmode

$\oslash$

Score: 0.12472708321409938

`\usepackage{ wasysym }`  
`\clock`  
textmode & mathmode

$\upphi$

Score: 0.13382072884929772

`\usepackage{ upgreek }`  
`\upphi`  
mathmode

The symbol is not in the list? [Show more](#)

Did this help?

# Links to Additional Resources

- Free Introduction to LaTeX [View](#)
- Reference Management: Linking your Mendeley Account [View](#)
- Working Offline with GIT [View](#)
  
- How to create plots and figures with Plot.ly and import them into your Overleaf projects [View](#)
- How to publish your projects on Figshare to get an instant DOI [View](#)
- How to import your references from Zotero and CiteULike [View](#)
- How to setup an auto-backup using Overleaf → Dropbox → BitBucket (external) [View](#)

Thank you!

[www.overleaf.com](http://www.overleaf.com) | [john@overleaf.com](mailto:john@overleaf.com)

